Efficiency standards versus negotiated agreements in the electrical appliance sector

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EFFICIENCY STANDARDS VERSUS NEGOTIATED AGREEMENTS IN THE ELECTRICAL APPLIANCE SECTOR

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Abstract: Energy labelling and minimum efficiency performance standards have proved to be very effective in stimulating energy efficiency improvement in the domestic appliance sector. But standards suffer from long and often difficult implementation periods because of the resistance of the industrial sector. As a consequence, the question has been raised as to whether similar results could not be obtained more easily and at lower cost with voluntary agreements, which offer flexibility margins in the achievement of commitments. This paper analyses the specific advantages of voluntary agreements compared with efficiency standards in the domestic appliance sector. We conclude that voluntary agreements may be an effective instrument in this respect but in certain conditions. The alternative of regulatory measures must remain a credible, realistic threat if voluntary agreements are to have a really significant impact on performance improvement.

1. INTRODUCTION

Because of the increase in the use of lighting and the rising ownership of household appliances and electronic equipment, domestic electricity consumption for specific uses (household electrical appliances and lighting) has increased dramatically over the last twenty years in industrialized countries. According to the International Energy Agency, household appliances are the second greatest source of electricity consumption in the OECD countries and the third source of greenhouse gas emissions (IEA, 2003). Consumption will probably continue to grow at a steady rate despite the expected saturation in ownership level of certain appliances. The IEA has projected that electricity consumption by domestic appliances will continue to increase by 25 % between 2000 and 2020 despite the energy management policies

already introduced [the increase would have been 60 % without any kind of energy policies (Ibid.)].

The possibility of controlling growth in electricity consumption, especially in the residential and tertiary sectors, is one of the conditions for reducing greenhouse gas emissions in virtually all the industrialised countries. The technological opportunities for improving the energy efficiency of electrical appliances are numerous (IPCC, 2001), but because of market risks these opportunities have not been sufficiently explored by manufacturers. Public policies introduced in this field are designed to accelerate the penetration of more energy efficient technologies and to inject more momentum into the process of technological change.

The strategy adopted by the European Union to accelerate the diffusion of energy efficient technologies has been to associate a consumer information device - a labelling programme - with a regulatory device in the form of minimum energy performance standards (MEPS). Energy labelling of domestic cold appliances thus became compulsory in all the European member States in 1995 and subsequently for other domestic appliances, in particular, washing machines, dishwashers, clothes dryers, and residential lighting equipment.. This was followed in 1999 by MEPS designed to eliminate the least efficient products from the market.

This combined approach was effective in transforming the household appliance market, with labelling acting as an incentive to innovate and thereby complementing the regulatory approach which is generally not very effective in stimulating innovation. However, regulations raise a lot of opposition among manufacturers and consequently often require considerable time for implementation. The more flexible solution of voluntary agreements thus emerges as a possible alternative that is easier to implement while remaining just as effective.

The aim of this paper is to examine whether negotiated agreements can be as effective in stimulating the diffusion of more energy-efficient technologies in the household appliance sector as the combined action of labelling and performance standards. First, we illustrate the effectiveness of this combination of information and regulatory measures by referring to the example of cold domestic appliances, and we show that the synergy of the two instruments makes it possible to go beyond the usual limits of the regulatory approach in stimulating technical progress. We then examine the advantages of negotiated agreements from the point of view of the manufacturers and the public authorities and the reasons why the European Commission is increasingly interested today in adopting this type of approach to improve energy efficiency in the household appliance sector. We provide details of the negotiated agreements on washing machines that became applicable at the same time as the regulations concerning cold appliance performance standards, thus making it possible to observe the similarities and differences between these two instruments. Our discussion concludes that negotiated agreements can be truly effective only if there is a constant, credible threat of regulations.

2. THE SYNERGIC EFFECTS OF LABELLING AND EFFICIENCY STANDARDS

The European policy concerning transformation of the domestic appliance market was implemented essentially through two complementary measures: labelling programs to improve consumer awareness and MEPS. This combination may seem

paradoxical in that performance standards are intended to set regulatory efficiency levels when the price signal is ineffective in promoting energy efficiency, whereas the primary purpose of labelling is in fact to provide a market signal to stimulate the purchase of efficient appliances by better informing consumers. Experience in the European Union over the last few years has proved, however, that these two instruments can co-exist very effectively and have very interesting characteristics where stimulating technological change is concerned.

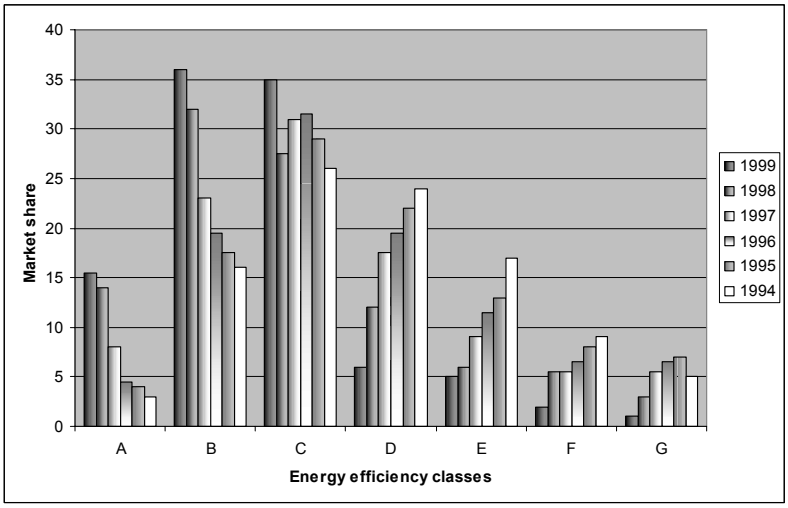
2.1 Impact of energy labelling on purchasing behaviour

Lack of information for consumers is generally considered to be one of the main barriers to improving energy efficiency through the adoption of more energy efficient technologies. Comparison labels and endorsement labels are two ways of solving this problem by providing information on the energy efficiency of appliances, thereby encouraging consumers to compare products and choose the most efficient.

Comparison labels enable consumers to compare the energy efficiency of all the products in a particular category (refrigerator/freezers, clothes dryers, washing machines, etc.). The European Label – EUR- or EnergyGuide – USA are examples of such labels. Endorsement labels simply identify appliances which are particularly energy efficient. An example is the Energy Star program in the USA. The first type generally applies to all the products on the market, whereas endorsement labelling is a voluntary scheme in which manufacturers may participate.

Following the example of the USA and Canada, Europe introduced a framework for energy labelling in 1992 (comparison labels). The program became effective in 1995 for domestic cold appliances and has gradually been extended to cover other household appliances. This measure has undoubtedly contributed to transforming the domestic appliance market even if its impact is difficult to distinguish from the general trend in improved energy efficiency resulting from improved knowledge (cf. supra). An analysis of sales from 1994 to 1999 shows a clear trend towards greater overall energy efficiency in the domestic cold appliance market in Europe, with a significant shift in sales towards more efficient appliances (classes A, B and C) at the expense of the less efficient classes (E, F and G) (Figure 1). By the end of the 1990s, there was a 30% improvement in average energy efficiency compared with the beginning of the decade (CEC, 2000).

Energy labelling thus led to a transformation of the cold appliance market which is the result of a change in consumer preferences and changes in the marketing strategies of manufacturers and retailers (ECU, 1998). The influence of labelling on the innovation strategies of manufacturers can be interpreted as follows: anticipating changes in consumer preferences or future regulations, manufacturers discontinued certain models that had become difficult to sell (expensive and not energy efficient), improved - sometimes marginally - the appliances destined to remain on the market and gradually introduced new more efficient products. In 1998 at the Confortec electrical appliance show, all the manufacturers had introduced new more efficient models into their product ranges, and some had focussed on energy efficiency by presenting mainly class A and B appliances.



Source: CEC, 2000

Figure 1: *Cold domestic appliance sales in Europe*

Labelling is thus a powerful instrument for differentiating products, and one which can promote innovation among manufacturers who wish to use this device to improve their competitive position or to gain an edge in new market niches.

But labelling programs clearly have their limits. Their success depends to a great extent on the differences in efficiency between appliances and the related financial stakes for purchasers. Furthermore, labelling does not prevent the least efficient models from remaining on the market nor consumers from buying them. For this reason, programs imposing MEPS for household appliances generally accompany labelling programs.

2.2 Labelling and efficiency standards: a necessary complementarity

By definition, efficiency standards are based on a regulatory process which affects all the manufacturers in a particular country or economic region. The aim of such standards is to complement labelling schemes or to replace them in cases where the energy price signal is not strong enough to encourage consumers to purchase the more efficient appliances, which may happen even though comprehensive information is supplied.

In Europe, domestic cold appliances were the first to be subjected to performance standards. According to the Directive 96/57/CE of the European Parliament:

> Member States shall take all necessary measures to ensure that refrigeration appliances covered by this Directive can be placed on the Community market only if the electricity consumption of the appliance in question is less than or equal to the maximum allowable electricity consumption value for its category as calculated according to the procedures defined in Annex I.

The standard was chosen so as to obtain an improvement of 15% in the average energy efficiency of new appliances. From September 1999, appliances not belonging to efficiency classes A, B or C could no longer be sold, which meant that 40 % of the appliances on sale in 1996 had to be withdrawn from the market.

The effectiveness of the regulations is evident from an examination of the new products introduced on the market:

> All D, E, F and G appliances have been removed from the market, with the exception of chest freezers, for which E-class appliances can still be sold (Appliance Efficiency, 2000).

Are we to understand that labelling has just been a preparatory step to the introduction of legislation on energy efficiency, the latter being ultimately the most effective instrument for transforming the market? Does labelling still have an impact or can such schemes be discontinued to leave efficiency standards to do the job alone?

When efficiency standards are introduced, manufacturers are encouraged to improve their products so as to comply with legislation, but it does not necessarily encourage them to develop new highly efficient products if they are not required to do so by the consumers. To promote innovation, very stringent energy efficiency levels must be imposed, so that manufacturers will be compelled to innovate, or provision must be made for a gradual tightening up of regulations taking into account the improvements already made. But without additional incentives, the energy efficiency of appliances would remain overall much the same, since (most) manufacturers would simply ensure that their products were positioned just beyond the regulatory performance level. Manufacturers can in that case oppose the introduction of new more stringent standards by arguing that the new targets are not realistic from a technological or economic point of view.

The advantage of labelling programs is not simply that they facilitate the introduction of standards by defining efficiency classes that can be used to determine the authorised efficiency levels. Labels also have a very important role in encouraging differentiation and are thus an incentive to technological progress. With labelling, manufacturers have the possibility of differentiating their appliances from standard products, something they can achieve through innovation. This will gradually have an impact on all the appliances on the market and ultimately lead to higher efficiency standards.

By stimulating the arrival of new more efficient products on the market, labelling schemes thus condition the effectiveness of regulations. Such schemes must be constantly reviewed if they are to remain a way of differentiating between products. If efficiency classes are not redefined regularly, the combined result of labelling and standards will be that most appliances will be positioned in the highest efficiency classes and it will be impossible to identify new appliances that are even more energy efficient. A labelling scheme which can evolve and which operates in conjunction with MEPS that are periodically revised thus seems to be a particularly effective method and one that appears well suited to the transformation of the household appliance market.

2.3. The limits of regulatory measures

The regulatory approach nevertheless has certain limits. In particular, it is reputed to provide little incentive for technical change. Faced with the introduction of performance levels, manufacturers generally react by proposing products that meet the minimum requirements but they are not encouraged to go beyond these. Furthermore, the apparent simplicity of the regulatory approach should not hide the real difficulties involved in implementation. The great majority of manufacturers are opposed to the introduction of MEPS which they consider to be a limitation on their room to manoeuvre in terms of technological innovation. For them, such standards represent an additional constraint that results in higher production costs. Coupled with costs related to new environmental regulations (elimination of CFCs for refrigerators), this increase in production costs will be reflected in the selling price and could have a negative effect on the household appliance market. Finally, manufacturers are not a priori convinced that greater energy efficiency is necessarily desired by consumers, especially if it means sacrificing certain features to which they have become attached (for example, American style two-door refrigerators which consume considerably more electricity).

Without the cooperation of manufacturers, defining MEPS generally becomes a long and complex process (cf. infra). Thus the initial proposal to introduce performance standards in Canada in 1984 met with strong opposition from Canadian household appliance manufacturers' associations, which succeeded in blocking the initiative until 1988. Their position with respect to standards radically changed, however, following adoption of federal standards by the United States in 1987, a decision that engendered certain economic risks for Canadian industry (Varone, 1998).

On the other hand, the introduction of a single federal regulation in the United States was carried out relatively quickly because of manufacturers' concerns about the increasing number of specific performance standards in different American states. The constraint of a federal standard was then considered to be preferable to the risk of development of a national market that was totally heterogeneous from the point of view of technical requirements. If it had not been for this very specific context, federal regulations on energy efficiency may not have seen the light of day, or at least not as rapidly.

Similarly, the process leading to the adoption in Europe of a regulatory measure on the energy performances of domestic cold appliances was very long. According to European Community law, member States cannot introduce national legislation that might limit the free movement of goods and services within the European Union. The Commission thus quite logically opposed the decision of certain member States, at the beginning of 1990s, to introduce MEPS for household appliances, but agreed, on the other hand, to prepare common regulations for the Union within a relatively short time. The proposed directive was presented to Parliament and the Council of Ministers in December 1994, which was more than 2 years after The Netherlands had informed the Commission of their draft regulation on the energy efficiency of refrigerators[1]. This considerable time lapse may be explained by the difficulty of negotiations with manufacturers who contested the principle of regulations but also with certain member States which considered that such regulations would have very different economic consequences from one country to the next (Bertoldi, 1999).

While regulatory measures appear well suited to improving energy efficiency in the household appliance and office automation sectors, it cannot be denied that they present implementation problems on account of opposition from manufacturers. Adopting an approach of consultation and negotiation between public authorities and private actors with a view to defining objectives for energy efficiency improvement may, in these conditions, prove to be just as effective and even quicker to put into practice.

3. VOLUNTARY AGREEMENTS: AN ALTERNATIVE TO REGULATIONS?

Since the early 1990s, voluntary agreements have been considered an instrument of environmental policy in their own right (S. Baecke and alii, 1999). They are no longer limited to certain sectors such as waste management, electricity generation, or the high energy-consuming industries but have been gradually extended to other sectors, including fairly recently to the home appliance market.

Recently the European Commission negotiated agreements with manufacturers of televisions and video cassette recorders, as well as with washing machine manufacturers, with the aim of improving the energy efficiency of these appliances (CCE, 2000). Reflecting the position of certain member States and a large majority of manufacturers, the Commission is showing a growing interest in such negotiated agreements, which are increasingly seen as an alternative to what are felt to be overly restrictive regulations.

3.1. More effective than regulations from a theoretical point of view

In theory, voluntary commitments have a number of features which, in economic terms, make them more effective than regulatory measures.

When it comes to defining efficient environmental objectives in economic terms, public authorities are penalised by their poor knowledge of existing technical options and the cost of implementing them. There is information asymmetry between manufacturers, who are very well informed about technologies and costs, and the regulating authority. The consequences have two aspects:

- it is in the interest of firms subjected to the regulations to overestimate pollution abatement costs to encourage the regulating authority to define less restrictive overall objectives.
- it is impossible to impose differentiated objectives to take into account the particular situation of each firm. This means that marginal pollution abatement costs differ for each firm, which for the economist characterises an inefficient solution.

Voluntary agreements have a theoretical advantage in this respect in that distribution of the objectives among the different firms is left to the firms themselves. Pollution abatement objectives can thus be allocated among the firms according to their particular technical possibilities and implementation costs. Cost minimisation is reached if the allocation leads to the equalisation of private marginal abatement costs; the distribution of objectives is then optimal (Glachant, 1999). In reality, burden sharing is not necessarily optimal, but the principle of negotiating individual commitments introduces an element of flexibility not found in the regulatory approach.

Furthermore, the inter-firm negotiations and cooperation that are necessitated by voluntary commitments in any given sector can contribute to a collective learning process that is beneficial to each individual firm:

> When using voluntary agreements, intense collective learning improves information of the firms and allows them to implement their private pollution abatement objectives at lower cost (M. Glachant, 1999).

This works for a relatively homogeneous business sector and in a context of general uncertainty:

> All the firms are in the same situation of uncertainty concerning available techniques and related costs, and are more encouraged to co-operate with one another to make up for the lack of information (C. Defeuilley, 2000).

Another advantage of voluntary agreements compared with regulations is that the negotiation framework gives firms the chance to participate directly in defining the objectives and the target dates for implementation. It is true that public authorities may also consult industry when drawing up regulations, but it is the regulator that has the final word. In the case of voluntary agreements, the objectives are defined jointly by manufacturers and the public authority.

Voluntary agreements also have a number of advantages for public authorities:

- similar environmental objectives can be reached in a shorter time and at a lower cost than in the case of regulations because of the voluntary nature of manufacturers' participation.
- where there is asymmetry of information (general case), negotiating with companies can provide the regulating body with the opportunity to obtain information about technologies and implementation costs.
- finally, since commitments are partly self-monitored by participating companies, public administration and monitoring costs are reduced.

But voluntary agreements have different limits. When a few firms make a voluntary commitment, the others may feel that they do not have to make any significant effort to reduce pollution and the overall impact on pollution abatement may be limited. Voluntary agreements must therefore involve a large majority of manufacturers in the market or define an overall objective for energy efficiency improvement if there is to be any effective benefit to the environment.

Moreover, the real environmental impact of a voluntary agreement cannot be measured simply in terms of achieving objectives. The objectives themselves must correspond to a real effort on the part of firms and not simply be part of a general trend in energy efficiency improvement. Since such agreements are by definition the fruit of negotiations where each party does not have the same information, the regulating authority does not know the real effort that will be required from the firms involved. The objective agreed upon may correspond to the general trend in energy efficiency improvement (business as usual scenario) and require no additional effort from the manufacturers. In this case the agreement would have no environmental impact in itself.

Finally, voluntary agreements can be upsetting for individual markets. Where a limited number of companies are signatory, non-participating firms benefit from short-term advantages (continued use of high-pollution, low-cost technologies, limited R&D investments, etc.) compared with those who agree to contribute to a joint effort to respect pollution abatement commitments (free-riding behaviour). On

the other hand, an agreement limited to a few firms with a certain technological lead could give them a strong market position and end up creating unfair competition.

***Table 1**: Effectiveness of regulations and voluntary agreements*

	Regulations	*Labelling and regulations*	*Negotiated agreements*
Participation of firms	-	+/-	++
Implementation time	-	-	++
Administrative costs	-	-	+
Incentive to innovate	-	+	+/-
Environmental impact	+	++	+/-

3.2. The example of negotiated agreements for washing machines

In 1996, the European Committee of Manufacturers of Domestic Equipment (CECED) drew up a proposal for a voluntary agreement to improve the energy efficiency of washing machines sold in Europe. This proposal led to the first negotiated agreement with the European Commission on energy efficiency in the domestic appliance sector (CECED, 1997). It was followed by several other proposals concerning televisions and video cassette recorders, dishwashers, electric water heaters and refrigerators, while during the same period no new regulations governing MEPS were introduced. For the Commission, negotiated agreements modelled on the one described below are now a credible alternative to regulatory measures.

3.2.1. Content of agreement

The proposal was discussed in depth by manufacturers and the European Commission and an agreement was finally concluded in December 1998 whereby manufacturers agreed to:

- improve the energy efficiency of washing machines sold in the European Union: the objective was a 20% improvement over the period 1994-2000, corresponding to a reduction in the energy consumption of a standard wash cycle from 0.30 kWh/kg in 1994 to 0.24 kWh/kg in 2000.
- gradually phase out production and importation of the least efficient models in two successive stages: in the case of standard washing machines[2] elimination of models in energy label classes E, F and G from 31 December 1997, followed by those in class D from 31 December 1999,
- inform consumers about the conditions of use of washing machines and their impact on energy consumption (choice of programmes), conduct research programmes on low-temperature washing techniques, and increase cooperation with detergent manufacturers.

Furthermore, the CECED agreed to monitor improvements in the energy efficiency of washing machines and report regularly to the European Commission.

This provided a way of checking that manufacturers' commitments were genuine and that the objectives were reached.

The Commission's approval confirmed the acceptance of the proposal by the public authorities and the implicit agreement not to introduce regulations imposing MEPS for this type of equipment for the duration of the agreement (Bertoldi and Bowie, 1997).

3.2.2. A transparent procedure for defining objectives

The procedure for defining the objectives adopted in the context of these agreements is particularly interesting. Indeed, it might be quite legitimate to question the reality of the additional efforts made by manufacturers in the framework of certain agreements, especially when the objectives negotiated correspond to spontaneous technological progress. In the present case, the objectives accepted by manufacturers were defined on the basis of a preliminary analysis conducted by the public authorities for the purpose of drawing up regulations (GEA, 1995). This technical-economic analysis was used to estimate an "optimum" energy efficiency level among the different technological options available (least life cycle cost analysis), taking into account overall cost and return on investment of each option in relation to a reference situation. The energy efficiency improvement recommended on the basis of this study, considered to be technically possible and economically viable, was 25% compared with 1994. The proposal from manufacturers made explicit reference to this study, suggesting a target of a 20% improvement over a 5-year period (1994 –1999). [3]

Unlike certain voluntary agreements where the objectives are defined more or less unilaterally by industry and where improvements are hard to distinguish from the general trends in technological progress and/or spontaneous development of the markets, the energy efficiency improvement targets here were based on an independent analysis. They took into account the state of technology and prospects for improvement, as well as the economic consequences for consumers. As F. Moretti, Chairman of the CECED working group on energy efficiency, points out:

> As it is based on the conclusion of a SAVE Study, it is guaranteed that the total saving target is well aligned with public and political expectation, but the method how to reach the goal is essentially left to the manufacturers. (Moretti, 2003)

It is therefore reasonable to assume that these goals were in the end similar to those that the European Commission might have introduced in the context of MEPS that would have been based on the same preliminary studies[4].

3.2.3. Monitoring of commitments and ways of imposing sanctions

For the Commission, negotiated agreements on the energy efficiency of household appliances must comply with a certain number of conditions if they are to be a viable alternative to regulatory measures (Bertoldi and Bowie, 1997):

- the manufacturers signing the commitment must account for at least 80% of the appliances sold on the European market
- the quantitative targets must correspond to a significant improvement in the energy efficiency of the appliances over a reasonable timescale

- finally, the system must include an independent monitoring procedure for verifying that improvements are coherent with the stated objectives.

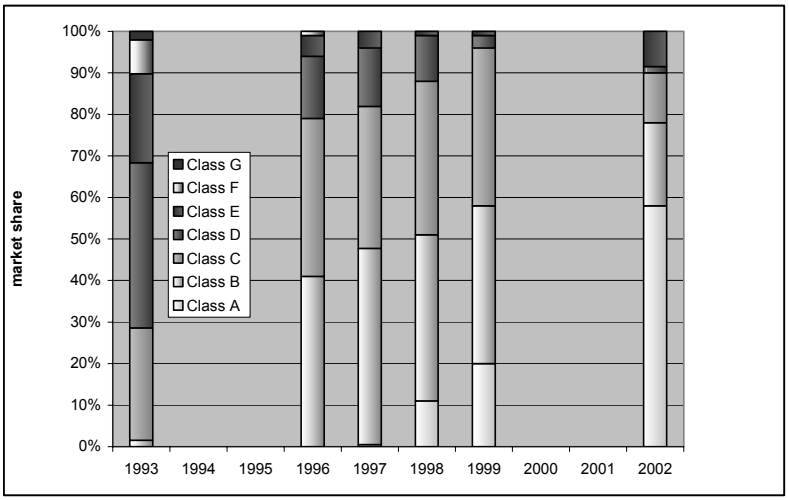
In accordance with these conditions, the agreement in question involved most of the manufacturers in the sector since the CECED represents over 90% of the market in a sector where imports from outside the European Union are very limited.

A procedure for monitoring and reporting was also set up. It was based on a data base containing information on the energy performance of washing machines marketed in Europe and monitoring by an independent observer of the appliances sold. A report was submitted to the Commission once a year setting out the improvement achieved.

The agreement also included measures to dissuade free-riding. Thus, each signatory was bound to respect the terms of the agreement concerning the import or marketing of inefficient models and to help achieve the average sales-weighted energy efficiency improvement. In the case of non-compliance, the CECED would first ask the manufacturer to comply with the agreement, and if this failed the manufacturer concerned would be deemed no longer party to the negotiated agreement. Such decisions are made public in the press, which provided a strong incentive for manufacturers to respect their commitments and avoid tarnishing their image.

3.2.4. Results in line with commitments

The report submitted to the Commission by the CECED at the end of 1999 indicated that manufacturers had complied with the commitments they had made. The average sales-weighted energy consumption of washing machines at this time was 0.228 kWh/kg, representing a 24% improvement in energy efficiency compared with the reference situation in 1994. The initial objective of 20% for the period 1994-2000 was achieved and even surpassed before the target date (end of 2000). Similarly, in accordance with their commitments, manufacturers had withdrawn the least energy-efficient models (classes D, E, F and G) from the market; the few models remaining in class D had disappeared by the end of 1999. Finally, the report submitted to the Commission by the CECED also mentioned additional action taken by manufacturers to help control the energy consumed by washing machines (improvement in energy efficiency of low-temperature cycles, cooperation with detergent manufacturers, consumer information).



Source: Moretti, 2003

Figure 2: *Evolution of sales of washing machines according to energy classes*

For manufacturers, the results obtained demonstrate the effectiveness of the negotiated approach since the objectives defined in consultation with the public authority were reached before the planned date (CECED, 2000). Given the success of the first voluntary commitment, the manufacturers prepared a second proposal, submitted to the European Commission at the end of 2002, which adopted the same structure as the first:

- an improvement in the average sales-weighted average energy efficiency of 12% compared with the situation in 1999 (a 33% improvement compared with 1994) corresponding to an objective of 0.20 kWh/kg for the year 2008;
- an end to the import and sale of appliances in energy class D by the end of 2003;
- support of manufacturers for additional measures to achieve energy savings (labelling, financial incentives, etc.) as well as different commitments similar to those in the previous agreement concerning information for consumers

The first results published at the end of 2003 seem to indicate that manufacturers have continued their efforts to improve the energy efficiency of washing machines. Sales weighted energy efficiency thus reached 0.208 kWh/kg at the end of 2002, the target of 0.20 kWh/kg being fixed for 2008. Similarly, the objective of totally eliminating class D models, irrespective of their characteristics, was well underway since the number of class D models sold represented no more than 1% of sales.

3.2.5. A specific characteristic: flexibility

The commitments made by manufacturers within the framework of these negotiated agreements are not very different from the constraints imposed by the regulatory measures if we consider in particular the MEPS imposed on domestic cold appliances. In the present case, the manufacturers are also committed to a precise

calendar for the withdrawal of those appliances with the highest energy consumption.

The fundamental difference in relation to regulatory measures concerns the flexibility allowed by the agreements. The objectives indicated above and recalled in Figure 2 concern the most popular models, but special provisions are made to take into account the significant differences existing between the national markets within the European Union: small washing machines and those with low spin speeds, which are in widespread use in the countries of southern Europe, benefit from an additional period of time in which to adapt. Under the second voluntary commitment, the complete elimination of all class D models is only programmed for the end of 2003.

At the time the first agreement was concluded, between 10 and 11% of machines sold in the European Union did not meet the new requirements, but for certain manufacturers this proportion was in excess of 30% of sales (CEC, 2000). Moreover, if all the washing machines sold in Europe had had to achieve the same improvement in energy efficiency, average prices would have increased by 1 to 2% in Northern Europe but by as much as 8 to 14% in Southern Europe and the United Kingdom where the proportion of machines in the low efficiency classes is highest (CEC, 2000).

For manufacturers, this approach allowing a rapid improvement in energy efficiency in northern European markets, where consumers are more sensitive to the energy efficiency criteria, and a more gradual change in those of southern Europe, thus better takes into account the characteristics of the market and ultimately proves to be less costly than non-differentiated regulatory measures.

***Table 2**: Flexibility in the agreements for washing machines*

	Target date	*A*	*B*	*C*	*D*	*E*	*F*	*G*
General								
Load > 3 kg & Spin speed > 600 rpm	1998					**X**	**X**	**X**
	2000				**X**			
Exceptions								
Load < 3 kg	1998						**X**	**X**
	2000					**X**		
	2004				**X**			
Load > 3 kg & Spin speed < 600 rpm	1998					**X**	**X**	**X**
	2004				**X**			

Source: CECED, 2000, 2002.

4. CONCLUSION: VAS ARE AN EFFECTIVE INSTRUMENT FOR MARKET TRANSFORMATION UNDER CERTAIN CONDITIONS

Regulatory measures that impose MEPS for all available appliances have proved their effectiveness. In association with energy labelling, which encourages consumers to differentiate products, they can be effective in stimulating

technological progress. However, the regulatory approach assumes a strong commitment on the part of public authorities, and preparation times may be long because of opposition from manufacturers. Negotiated agreements, by virtue of their greater flexibility, which makes them easier to implement, can be an interesting alternative to regulations.

These agreements have a great deal in common with the MEPS introduced for cold appliances. They anticipate the gradual removal of the least efficient models from the market. A first analysis would therefore suggest that they have no particular interest for manufacturers compared with regulations. However, they include an important dimension of flexibility which the regulatory approach does not have. With negotiated agreements, the manufacturers have the possibility of stepping up the introduction of new more efficient models on the more dynamic markets and delaying the discontinuation of less efficient models on other markets, rather than having to simultaneously improve the efficiency of all their appliances, which would be much more costly.

Similarly, negotiated agreements offer several advantages from the point of view of public decision-makers, namely more rapid implementation, a cooperative approach that enables access to non-public information, lower preparation and monitoring costs on account of the involvement of manufacturers, and so on. The essential question, however, concerns their environmental efficiency. To ensure improvements from an environmental point of view, manufacturers must make commitments that impose a genuine additional effort that goes beyond the general trend in energy efficiency.

In the case of the agreements for washing machines, it was possible to impose fairly ambitious objectives because of the threat of regulatory measures. Indeed, the possibility of regulatory measures in the household appliance sector became very real following the introduction of MEPS for domestic cold appliances. Since the bargaining power was then in the hands of the public authority (in this case the European Commission), it was able to impose constraining targets (similar to those that would have been obtained by energy efficiency regulations). In exchange, manufacturers have obtained a certain flexibility regarding implementation periods and methods.

For negotiated agreements to be effective at the environmental level, it is essential that the possibility of regulatory measures remain a realistic threat. During the negotiating process, the level of constraint imposed, and thus the type of incentive to be offered to firms, depends on the respective powers of the companies and the public authority. A very restrictive requirement (realistic threat of regulations) may result in ambitious objectives that force firms to make real additional efforts. On the other hand, if the threat of regulations is not really credible, the public authority's negotiating power is limited and companies have considerable room for manoeuvre, with the consequent risk of accepting commitments which are not very different from general market trends.

The credibility of the regulatory threat depends directly on the information the public authority has regarding the firms' room for manoeuvre, the technological opportunities available and the implementation costs. Considerable preparatory work is thus essential so that the regulating body can obtain a maximum of information and negotiate ambitious targets. This means that paradoxically negotiated agreements do not necessarily involve shorter implementation times or

lower preparation costs than the regulatory approach if their aim is to achieve the same level of environmental efficiency.

5. NOTES

[1] The Directive was adopted in September 1996 and took effect in the different member States in September 1999, in other words 5 years after a first proposal was presented to Parliament.

[2] These rules apply to the most popular models, that is those with a wash capacity of over 3 kg and a spin speed of over 600 rpm. Special measures were planned for models of smaller capacity or with slower spin speeds (cf infra).

[3] In the second negotiated agreement on the energy efficiency of washing machines (CECED, 2002), reference was similarly made to the SAVE II study sponsored by the European Commission which set energy efficiency improvement objectives for washing machines (Novem, 2001). However, in this case manufacturers did not take up the objective proposed in the study, which was to reduce energy consumption to 0.20 kWh/kg by 2003, suggesting instead that they reach this target only by 2008.

[4] For the purpose of comparison, the energy efficiency improvement sought by the introduction of performance standards for domestic cold appliances was of the order of 15% for the period 1996-99 (Bertoldi, 1999).

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